Report for 2001DC4021B: Teacher Education: Technology of Water Environmental Education

There are no reported publications resulting from this project.

Report Follows:

WATER ENVIRONMENT STUDIES IN SCHOOLS
IN-SCHOOLS PROGRAM

OF

THE UNIVERSITY OF THE DISTRICT OF COLUMBIA
AGRICULTURAL EXPERIMENT STATION

PROGRAM SUMMARY

INTRODUCTION

The University of the District of Columbia ("UDC") Agricultural Experimental Station ("AES") and Water Resource Research Center (WRRC), in collaboration with Browne Junior High School, Terrell Jr High School and P.R. Harris Educational Center proposed the **Water Environment Studies In Schools ("WESS")** to engage students in the exploration, analysis and restoration of selected areas of the Anacostia River Watershed. Teachers from these Institutes engaged in ten-days of extensive training in water quality assessment and conservation during the summer. A ten-day follow-up summer program practicum was completed with students. Teachers implemented the program in school during the academic year.

Program Overview

The **WESS** program is designed to respond to the need for 1) environmental education in the schools; 2) teachers proficient in the writing of curriculum around the newly designed performance standards; and 3) innovative practices to improve math and science teaching and learning of teachers and students as expressed by DCPS administrators and teachers. The **WESS** program's focus is the Anacostia River Watershed in which the students and teachers are residents. The goals of **WESS** provide for 1) training for the schools' teachers in math, science, technology, art and humanities within water environmental studies; 2) involvement of students in the same discipline areas as required for the restoration and conservation of the Anacostia River and its flora and fauna; and 3) the development of a plan that engages the total community in the conservation of the Anacostia Watershed.

Student Program Activity

The **WESS Teacher Training Institute** is designed to empower teachers with the skills to introduce inner city students to environmental monitoring, assessment of land and water, data analyses including background rationale, scientific terminology, laboratory exercises, research projects, mathematical calculations and some specific

laboratory and field techniques. The program provides a unique "hands-on" educational approach that engages university professors, public school teachers, student mentors, and middle/junior high school students in the development of critical thinking and problem solving skills. To support this line of study, field laboratory stations for environmental land and water quality monitoring of the Anacostia River Watershed have been established. Locations for activities include the participating schools, UDC laboratories and the Anacostia River.

Through the implementation of the program, teachers will be able to guide their students to experience a variety of science, mathematics, art and humanities projects that promote improving water quality and water conservation for the Anacostia Watershed. The program agenda also includes community organization activities and the constant inclusion of cultural connections.

Program Goals *for Student Activity*

1. To establish a core group of teachers trained in the knowledge and technology to integrate environmental education into the total junior high school and middle school curriculum.

2. To provide teachers with the expertise to write curriculum that integrates the current performance standards and allows for their application and reinforcement in mathematics, science, arts and humanities through environmental education.

3. To provide teachers with the skills to help students to achieve and maintain the academic standards necessary to bridge the transition from high school to college in science, mathematics and technology.

4. To increase the participation of minority youth in environmental issues and enhance their perspective of the effect they have on the environment through project focus on the Anacostia River.

5. To create a community movement to benefit the local environment issue which, in this case, is the Anacostia River.

Program Objectives

1. To engage teachers in the **WESS** Teacher Training Institute for a ten-day training session on the information and technology for implementing water environment studies programs with students.

2. To engage students in environmental studies that can reinforce skills and performance standards in math, science and computer technology, primarily; and arts and humanities in the process of learning the tasks necessary for the restoration and preservation of the Anacostia River Watershed.

3. To design a plan to improve the ecological integrity and aquatic diversity of the Anacostia River Watershed that includes strategies for reducing pollutant loads to improve water quality.

4. To establish collaborative and working partnerships with community residents and watershed restoration groups that can increase public awareness and participation in the clean up and restoration of the Anacostia River Watershed.

5. To familiarize youth and teachers with the unique careers in environmental and water quality management.

WATER ENVIRONMENT STUDIES IN SCHOOLS
IN-SCHOOLS PROGRAM
EFFECTIVENESS EVALUATION

Introduction

This report provides formative and summative findings for the Water Environment Studies in Schools (**WESS**) *In-School* Program. The evaluation measures the effectiveness of the goals and objectives of the program and addresses the program's strengths and areas for improvement. The assessment was based upon data collected, including the proposal plans submitted by each school, the activities observed, the documentation of student experiences, and the submission and evaluation of the final projects.

Methodology

Data was collected throughout the project and was compiled at the end of the project. These methods were used to collect the data from the participants:

- An outline of the proposed project was submitted for each school.
- Observation Forms of classroom performances were completed by the Monitor.
- Informal observations were conducted by the monitor.
- Documentation of student experiences was provided.
- Documentation of each schools final project was submitted.

Overview

The **Water Environment Studies in Schools ("WESS")** ***In-Schools*** Program of the Agricultural Experiment Station (AES) and Water Resources Research Center (WRRC) of University of the District of Columbia (UDC) is a project that focuses on the Anacostia River Watershed. Designed to enhance children's awareness, as well as, the community's awareness of water environmental education, the program was conducted in three District of Columbia Public Schools. The three schools represented three quadrants of the city. The participating schools are Browne Junior High School located at 850 26th Street, NE; P.R. Harris Educational Center located at 4600 Livingston Road, SE; and R.E. Terrell Junior High School located at 100 Pierce Street, NW. Seventh and eighth grade along with the inclusion of special needs students represented the populations at Browne and R.E. Terrell Junior High Schools. Non-graded students ranging in age from

10 to 12, but functioning at second to third grade level represented the population at P.R. Harris Educational Center.

Program Mission

The mission for the program is to engage students in the exploration, analysis and restoration of selected areas of the Anacostia River Watershed. With this mission as a guide, the following school projects were designed and conducted.

Browne Junior High School

Focus

The focus of the project at Browne Junior High School was to engage students in hands-on water related experimentation activities exploring how water is purified and researching the history of the Anacostia River. In addition, the focus was to incorporate the water related activities with the on-going school program – "Connect" – Project-based Learning Environment. (This school-wide program promotes students' making connections in their learning as they explore projects based on multiple disciplines, common themes, and related concepts in an engaging learning environment.) Thus all of the WESS activities were incorporated into projects related to regular classroom instruction at Browne JHS.

Efforts Addressed through Standards-Based Curriculum

The following concepts and performances were addressed through the curriculum.

- Gaining an understanding of water purity;
- Designing flow charts to illustrate water purification;
- Using technology to increase students' awareness of the history of the Anacostia River and other water studies;
- Gaining an understanding of natural resource management; and
- Using creative writing skills to recapture historical events about the Anacostia River and to share information about water studies.

Classroom and Field Lab Activities

The participants engaged in the following classroom and field lab activities:

- Accessing information through the Internet and other sources of media to compose a research report depicting issues concerning the Anacostia River;
- Creating and photocopying a Newsletter for dissemination to the BJHS Community to arouse the awareness of the Anacostia River and its problems;
- Organizing and inviting the area residents to participate in a Non-point Sources Cleanup Day at Browne JHS; and
- Experimenting with water activities, conducting research for an anthology project, preparing photograph portfolios, exploring creative writing and other projects related to the Anacostia River project.

Culminating Performances

The following activities are a listing of the culminating performances. The students:

- Designed and prepared a computer generated Newsletter that showcased articles that depicted activities of the group and that promoted the need for the community to make an effort to help save the Anacostia River.
- Prepared and presented an anthology on the Anacostia River for BJHS students, the WESS monitor and others.
- Designed and prepared computer generated fliers to inform the school's student body and the neighboring community members about the Anacostia River, water conservation, and protecting the environment against pollution.
- Participated in a Non-point Sources Cleanup Day which included the immediate area at Browne JHS and the neighboring area.

R.E. Terrell Junior High School

Focus

The WESS Program at R.E. Terrell Junior High School was to engage students in standards-based activities as a means to stimulate their desire to learn about the importance of water and how it contributes to the sciences and to our environment. Experiences to support these activities include field lab investigations at selected water sites where experiments were conducted.

Efforts Addressed through Standards-Based Curriculum

The following concepts and performances were addressed through the curriculum.

- Creating an awareness of water purity;
- Testing water purity by investigating water samples from Anacostia River;
- Using technology to increase student's awareness of water studies;
- Increasing students' awareness of environmental scientists and the various water conservation methods that they employ; and
- Exploring various areas of study in water research.

Classroom and Field Lab Activities

The participants engaged in the following classroom and field lab activities:

- Surfing the Internet to collect information on facts about water (its uses, where its found, its varying conditions, and its importance);
- Exploring technology skills to develop Power Point Presentations;
- Interacting with guest speakers from organizations affiliated with the water environmental community and addressing issues related to the Anacostia River as well as careers related to water studies;
- Viewing videos on water biomes and water purification and viewing slide presentations about the Anacostia River and the Anacostia Watershed;
- Touring water sites including the National Aquarium, the Anacostia River and the Bladensburg Waterfront to gain an understanding of the importance of water and some of it' many uses; and

- Conducting test on water samples taken from the Anacostia River to determine the quality of the river water.

Culminating Performances

The following activities are a listing of the culminating performances. The students:

- Completed a survey to determine the effectiveness of the WESS project.
- Prepared a Power Point presentation on the study of water including the water cycle, an explanation of terms related to water and historical events about the Anacostia River.
- Analyzed and summarized data collected, based upon the test results of water samples from the Anacostia River (Bladensburg Water front Center).
- Designed and prepared computer generated Newsletter to share information gained throughout the study of water.

P.R. Harris Educational Center

Focus

The focus of the WESS Program at P.R. Harris was to introduce students to the study of water, water quality and pollution.

Efforts Addressed through Standards-Based Curriculum

The following concepts and performances were addressed through the curriculum.

- Gaining an understanding that water on earth moves in a continuous cycle,
- Naming and explaining the stages of the water cycle.
- Using Internet data to access information about the water cycle on the Anacostia River.

Classroom and Field Lab Activities

The students engaged in the following classroom and field lab activities:

- Exploring the study of water by focusing on the forms of water, where water is found, how pollution affects the use of water;
- Viewing videos and slide presentations about the Anacostia River and the Anacostia Watershed to make connections between the forms of water and the water cycle;
- Interacting with guest speakers from organizations affiliated with the water environmental community and addressing issues related to the Anacostia River and the water cycle;
- Conducting test on water samples taken from the Anacostia River to observe how pollution affects the quality of the river water; and
- Participating in Earth Day Cleanup and Celebration on Anacostia River as a means to help restore the river.

Culminating Performances

The following activities are a listing of the culminating performances. The students:

- Completed a survey to determine their understanding of the water cycle.

- Created drawings to illustrate their ability to describe the water cycle.
- Created drawings of pictures that represented their environment (community) including the water cycle.
- Conducted test on water samples taken from the Anacostia River.
- Participated in the Earth Day Cleanup and Celebration on Anacostia River.

Summary of Findings

Students from the three participating schools and community members from the surrounding neighborhoods benefited from the overall experience with the **WESS** *In-Schools* Program. In each of the schools the program's primary focus was addressed through science, mathematics and technology with a direct relation to the standards. One school included in their study an emphasis on research and creative writing skills. Again, the standards relating to those disciplines were addressed. All schools engaged in activities that focused on the Anacostia River. These activities ranged from writing an anthology on the history of the river, to testing and analyzing water samples taken from the river, to participating in the Anacostia River Cleanup Day. Students from the schools sort and received community support with their cleanup efforts. Members of the community as well as members from environmental groups offered their support to help with the effort of restoring the Anacostia River. In addition to these individuals providing assistance and information about restoring the river, they also provided information about careers in environmental science and water quality management. As a part of each schools project, they discussed restoration efforts for the river and initiated a plan to help increase public awareness and participation in the continuing cleanup of the Anacostia River.

It was a learning experience for all that were involved, directly and indirectly. Participation in the program promoted a list of positive outcomes and raised a number of issues that support the need and continuation of such environmental studies. The major benefits and areas of improvement are identified below:

Major Benefits to the Students:

- Gained a deeper understanding of water (ie., its uses, where it is found, the forms, water purification, etc);
- Gained an appreciation for the value of water and the value of a clean Anacostia River;
- Gained experience by working in teams and collaborating to solve problems;
- Gained experience in using the technology tools to gather, analyze and present data;
- Gained experience in writing efforts to inform the public about water – and in particular the Anacostia River;
- Gained an opportunity to view first hand, the positive and negative effects of what can happen to water in various situations; and
- Gained information regarding careers related to environmental studies.

Major Benefits to Community:

- Gained information about the value of protecting the water ways in the community;
- Gained information regarding the impact of pollution on the environment as a whole and in particular the impact of pollution on the Anacostia River;
- Gained an awareness of the many organizations available to help support the cleanup effort for the Anacostia River;
- Gained information about the pool of resources that environmental organizations have to share with the community; and
- Gained the efforts of student participants who are carrying the message to the community "Care for our water."

Strengths of the WESS *In-Schools* Program:

Based upon the evaluation of the program the following strengths are documented:

- Promotes environmental awareness;
- Promotes standards-based curriculum;
- Promotes the integration of the disciplines (science, mathematics, art, language arts/literature) ;
- Promotes the use of the computer and Internet accessibility to enhance the acquisition of information;
- Promotes collaboration and teaming efforts among students; and
- Promotes community involvement.

Areas of Improvement for WESS *In-School*s Program:

- Field trips to water sites should be encouraged for all schools.
- Broader scopes of inclusion of the WESS Project should be encouraged for all schools.

Recommendations for WESS *In-School*s Program

- Provide opportunities for the teachers in each participating school to met with other teachers in the program so that they can share ideas, problems that exist, possible solutions, beneficial organizations that can contribute to the program and general experiences.
- Provide a joint program effort wherein students can observe what the other schools have done in an effort to broaden their own ideas.
- Promote the idea for more teachers (ultimately results in more classes) from the participating schools to become involved in the program.
- Promote the WESS In-Schools program through parental involvement to increase community participation.

Performance-Based Standards Addressed through the Curriculum

The following standards and performances were addressed through the curriculum.

- Earth/Space Concepts: Water Cycle and Natural Resource Management
- Scientific Connections and Applications: Historical and contemporary contributions
- Scientific Thinking: Individual and team efforts to collect and share information and ideas
- Scientific Thinking: Identifies problems, proposes and implements solutions
- Scientific Thinking: Uses Science concepts to explain observations/phenomena
- Scientific Tools and Technology: Acquires information from multiple sources
- Scientific Tools and Technology: Uses technology and tools to observe/measure
- Scientific Communication: Communicates in a form suited to the purpose and the audience.